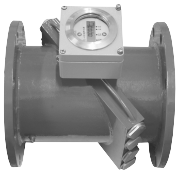
FLOW-S Series Ultrasonic Water Meter

Series Household-Use Version

S Series Industrial Version

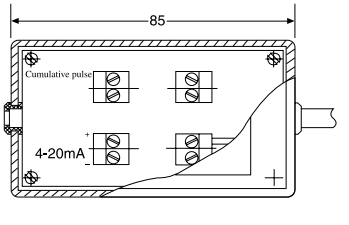
Installation & Operating Instructions



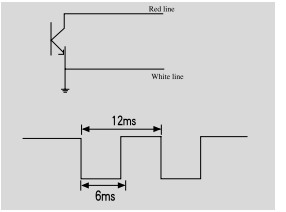
To our dear user:

Thanks for your selection for use of our FLOW-S series ultrasonic water meter. The battery-powered water meter with a high sensitivity to minimal flowrate and a high measuring accuracy, and capable of performing wireless transmission of meter reading can help you eliminate the discrepancy between the water supply volume and its sales volume and enhance your water meterage management level. Sailsors Instruments Ltd., Beijing is ready to provide you superior-quality products and first-rate service

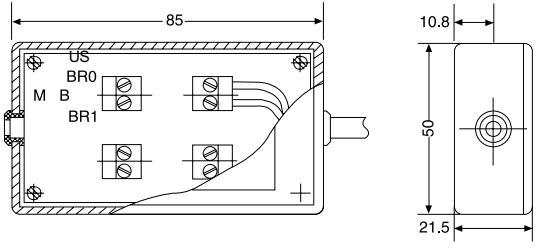
4～20mA output (including cumulative pulse output)



Cumulative pulse

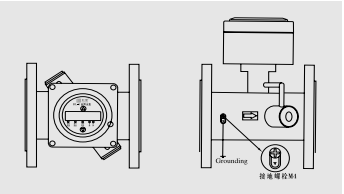


M-BUS output



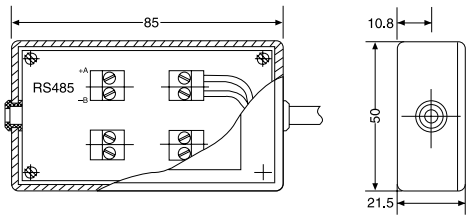
Appendix 1 Grounding

1. The need for meter grounding depends on the degree of electrical interference on site. If the interference is so severe as to affect the normal operation of the meter, the grounding is required. In general cases, there is no such need.
2. The ground conductor line must not be connected with other electrical equipment for avoiding the conduction of any interference voltage.



Appendix 2 Dimensions of various terminal blocks, mm
(Provided to the user according to the type of the meter selected)

RS485 output



1. General Description

- Operating on velocity-difference principle, the FLOW-S series ultrasonic water meter is specifically designed for urban water supply pipeline network and residential buildings. The conventional water meters suffer from the drawbacks that they are only operable at a higher initial flowrate and are insensitive to a small flowrate. However, the FLOW-S series meter can help tackle the bottleneck. And the meter is also highly adaptable to diversified industrial conditions.
- Due to the use of ultrasonic flow transducer, it has no mechanical moving parts, and is high in reliability, less in maintenance requirement and immune to magnetic interference.
- Highly sensitive to minimal initial flowrate and high in measuring accuracy. The use of the meter entails no pressure loss in pipe, and its maximum range ratio is 200:1.
- Extremely low in power consumption. Capable of working continuously for a period of over 6 or 10 years with a built-in battery cell.
- Capable of performing various output functions.
- Single-channel, double-channel and 4-channel options are available for selection.
- Three design versions are available, i. e. the ordinary, 2-way and anti-theft versions to cater to the different needs of users.
- The 2-way version (its model is the same as that of an ordinary version yet with a suffix D) can measure water flow and record cumulative running time in either positive or reverse flow direction.

- The use of the anti-theft version (indicated by a suffix A) can prevent anyone from gaining advantage by trickery in the use of water because the cumulative water flowrate measured by the meter is a cumulative total of the absolute instantaneous flowrate values in both the positive and reverse directions.
- All the technical data in this instructions refer to the ordinary version and are also applicable for both 2-way and anti-theft versions.
- The different versions of water meters are in conformity with the THIC enterprise standard Q/THY001-2004.
- FLOW-S series ultrasonic water meter is composed of the pipe section-mounted transducer and a conversion unit. For the industrial water meter, 3 different types of transducers are available for selection, i.e. the single-channel, double-channel and 4-channel versions.
- FLOW-SH series household-use ultrasonic water meter is in an integral form while the FLOW-S industrial type has 3 different versions out of which two are in integral form (Viewed from the top or the side) and one is in non-integral form.

Integral Version
- FLOA-SH Household-Use Version DN15-DN25
- FLOW-SD-x-C Industrial Version (Side View) DN50-DN250
- FLOW-SD-0-D Industrial Version (Top View) DN15-DN40
- FLOW-SD-x-D Industrial Version (Top View) DN50-DN250

C. Record the meter's instantaneous flowrate readings at fixed time interval. The readings should be taken continuously at least 20 times, and the minimum time duration for making a calibration each time is no less than 2 minutes.

D. Record the calibration system's standard flowrate qsi.

E. Calculate the mean instantaneous flowrate value qi.

> Note: The calibration must be made based on instantaneous flowrate.

Error computation $$E_i = \frac{q_i - q_{si}}{q_{si}} \times 100\%$$

- The error of the i^{th} flowrate point

  qi - The mean instantaneous flowrate displayed by the meter.

  qsi - The standard flowrate value of the i^{th} point

  qs - Standard flowrate

  At $q_{min} \leqslant q_s < q_t$, $E \leqslant \pm 2.0\%$

  At $q_t \leqslant q_s \leqslant q_{max}$, $E \leqslant \pm 1.0\%$

  Where:

  q_{min} — The minimum flowrate

  q_t — The boundary flowrate

  q_{max} — The maximum flowrate

- For the correction of meter coefficient, refer to the section on Setting of Parameters.

8. Calibration Method

The ultrasonic flowmeter is in conformity with the THIC standard《Ultrasonic Water Meter》Q/THY001-2004.

- According to the calibration requirement, a standard calibration system should meet the following requirements:
  - A. The system should have an effective calibration certificate.
  - B. The accuracy of the system must not exceed 1/3 of the basic error allowance of the water meter under calibration.
  - C. According to the THIC standard《Ultrasonic Water Meter》Q/THY001-2004, the system should have the required condition for the mounting of the water meter to be calibrated.
  - D. The system should have the following water flow conditions: a full-pipe unidirectional steady flow with a content of suspended matters less than 10g/l and a particle size of less than 1mm and without any entrained air.

- Requirements on water meter mounting conditions
  - A. The water meter should be concentrically aligned with the pipe, and the sealing gasket is not allowed to protrude into the pipe.
  - B. The water meter should be mounted in the same direction as that of the water flow.

- Calibration procedure
  - A. Upon completion of the mounting of the meter, start the calibration system to run for 10 minutes for flow stabilization and thorough evacuation of air.
  - B. Select the flowrate points at the meter's screen display of instantaneous flowrate and start the calibration work after the flowrate is in a steady state.

Non-Integral Version { FLOW-SD-x-E Industrial Version
DN15-DN250

- The FLOW-S series ultrasonic water meter can realize wireless transmission of meter readings via the GSM public network (For details, refer to the FLOW-SD/GSM Meter Reading Wireless Transmission Unit Operating Instructions.

2. Flowrate Measuring Range

Pipe ID (mm)		Start-up Flowrate	Min. Flowrate q_{min}	Boundary Flowrate q_t	Max. Flowrate q_{max}	Cumulative Flowrate (m3)	
		(m3/h) (m/s)				Max. Reading	Min. Reading
15		0.0019	0.0238	0.072	1.5	99999.999	0.001
20		0.0019	0.0238	0.072	2.5		
25		0.0045	0.056	0.169	3.0		
32		0.0073	0.092	0.275	12		
40		0.0114	0.144	0.429	20		
50		0.0353	0.35	2.1	50	9999999.9	0.1
65		0.06	0.60	3.58	80		
80	S-C*	0.09	0.9	5.43	130		
	D-C**	0.063	0.9	5.43	130		
100	S-C	0.141	1.41	8.48	200		
	D-C	0.099	1.41	8.48	200		
125	S-C	0.221	2.21	13.25	260		
	D-C	0.155	2.21	13.25	260		
150	S-C	0.318	3.18	19.08	320		
	D-C	0.223	3.18	19.08	320		
200	S-C	0.565	5.6	33.93	520		
	D-C	0.396	5.6	33.93	520		
	4-C***	0.226	5.6	33.93	520		
250	S-C	0.883	8.83	53.0	600		
	D-C	0.618	8.83	53.0	600		
	4-C	0.353	8.83	53.0	600		

Note: * S-C - Single-channel version ** D-C - Double-channel version *** 4-C - 4-channel version

3. Main Technical Data

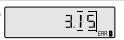
Item		FLOW-SH Household-use Version	FLOW-SD-1 1 Version [Single-channel]	FLOW-S-2(4) Industrial Version [2/4-channel]
Fluids Measured		Full pipe flow of water, sewage and other homogenous fluids with a content of suspended matters not exceeding 10g/l and a particle size of less than 1mm.		
Accuracy, %		± 1.0	± 1.0	± 0.5
Pipe Size Range, mm		DN15～DN25	DN15～DN250	Double-channel: DN80-DN250 4-channel: DN200-DN250
Max. pressure-bearing capacity of pipe section		1.6MPa		
Working environment	Conversion unit	Temperature: -10℃～+45℃; Humidity: 85% (RH) (For use under otherwise specific conditions, please specify on ordering.)		
	Transducer	Normal-temperature model:≤ 50℃, High-temperature model:≤ 100℃		
	Cable	-40℃～+65℃		
Output Signal		RS485 M-BUS	4-20mA (External power required - DC24V), Cumulative pulse (Cycle - 12m/s Pulse width - 6ms 0.1m3/pulse RS485 M-BUS and GSM/GPRS wireless transmission of meter readings	
Keyboard		Magnetic induction key or push button		
Display Mode		8-digit LCD + prompting character Word height:8.5mm Resolution: ≤ DN40mm:0.1L/H; >DN40mm:1L/H		
Display		Instantaneous flowrate (m3/h) Cumulative flowrate (m3) Cumulative effective running time (h) Date (yy/mm/dd) Clock (hh/mm/ss)		
Data Storage		Cumulative flowrate and cumulative effective running time (Data can be saved in EEPROM for 100 years after power fail.)		
Operating Power Source		Capable of operating continuously with one built-in battery for a period of > 10 years (Domestic version) and > 6years (Industrial version)		
Protection Class		IP54	Integral version D type (Viewed from the top): IP68 Integral version C type (Viewed from the side): IP65 Conversion unit of non-integral version:IP68 Display of non-integral version: IP65	
Power Consumption		<0.8mW		
Transducer-conversion unit connecting cable for non-integral model: standard length 6m.For non-standard cable length, please specify on ordering.				

6. Replacement of Battery

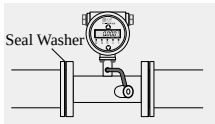
The water meter operates with a 3.6V lithium battery which has a service life of over 6 years at an ambient temperature of 0~35°C. When the symbol "" is displayed, it indicates that the battery is at low voltage and needs to be replaced.

Note: The battery replacement should be made by professional personnel. After battery replacement, the stored "cumulative flowrate" and "cumulative running time" can not get lost (If new batteries are needed, please contact our company).

7. Self-diagnostic Function

Diagnostic Prompt	Prompt Information	Remedial Measures
"ERR" keeps on display	1. Empty pipe 2. Conversion unit surface severely fouled with scale deposit 3. Faulty meter	1. Let the pipe to have full flow 2. Clear off the scale deposit 3. Contact our company for maintenance
Frequent display of "ERR"	Too much air bubbles or impurities in water	Remove them
Display of " "	Low battery	Replacement
Display of 	An indication of the low voltage value and the meter ceases to work for inadequate power. Yet in this case, the stored data can still be retrieved.	Replacement
Display of "88888888"	Faulty EEPROM	Please note down the current "cumulative flowrate" and "cumulative running time", and immediately contact our company for repair
Display of "44444444" (E type)	Transducer-conversion unit connection cable broken or not correctly connected. RS485 communication error	Check for correct connection.

(3) Place a seal washer between each pair of mating flanges (meter flange and pipe flange) and then fasten them up with bolts after alignment is made.

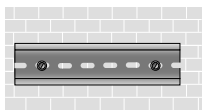


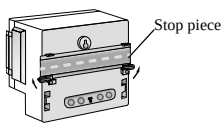
Caution: (1) The connection should be tightly sealed for avoiding water leakage.
(2) The arrow ⟶ on the meter should point to the same direction as that of the water flow.

III. Mounting of FLOW-SD-E conversion unit

Method 1

1. Fix the slide rail horizontally on the wall.

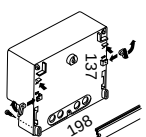




2. Hang the conversion unit on the slide rail. Then push upward the plastic stop piece to enable the unit to firmly grip onto the rail.

Method 2

Fix the conversion unit with screws according to the method as illustrated.



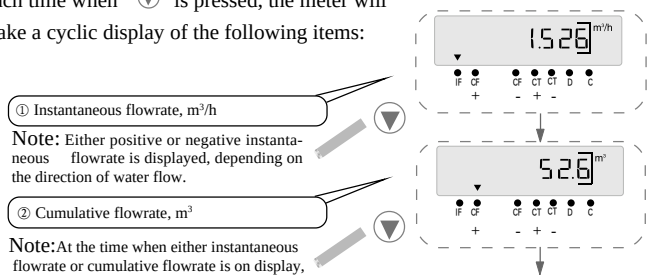
Note:

1. This is the front panel of the 2-way water meter. For the ordinary and anti-theft meters, there are no negative cumulative flowrate and running time display items.
2. The front panels of the C and D versions are all provided with glass protective covers. This type of front panel is operated with a magnetic induction key. When the induction key is pointed by a magnetic rod in a vertical position, 8 black inverted triangles are displayed. This indi cates that the meter enters the effective operation mode.
3. If the magnetic induction key is pushed manually, the 8 inverted triangles will also appear to show that the meter is in normal operation mode.

Operation and Display of the Integral Version

I. Display operation

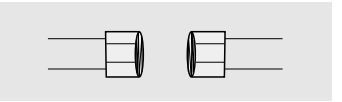
Each time when " ▼ " is pressed, the meter will make a cyclic display of the following items:


① Instantaneous flowrate, m³/h
Note: Either positive or negative instantaneous flowrate is displayed, depending on the direction of water flow.
② Cumulative flowrate, m³
Note: At the time when either instantaneous flowrate or cumulative flowrate is on display,
1.526
m³/h
52.6
m³

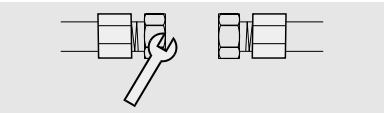
the display will stay on the screen if no other key operation is made. If the screen changes to other display and no further key pushing is made within 10 minutes, the screen will return automatically to cumulative flowrate display. For a 2-way version water meter, if the cumulative flowrate is on long time display, the screen will display the positive cumulative flowrate 8 times and the negative cumulative flowrate 8 times alternately.

Method 2 Using the connecting elements

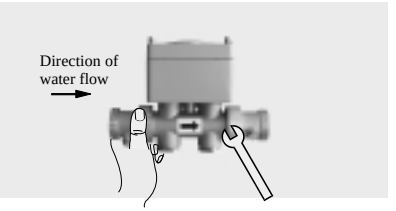
(1) Cut the pipe apart to provide the space for mounting the meter and connecting elements.



(2) Screw a connecting element onto each end of the pipe.



(3) Align the meter with the connecting element and then tighten them.

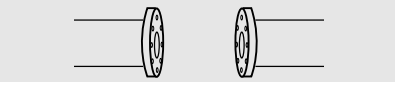


Caution: (1) The connection should be tightly sealed for avoiding water leakage.
(2) The arrow ⟶ on the meter should point to the same direction as that of the water flow.

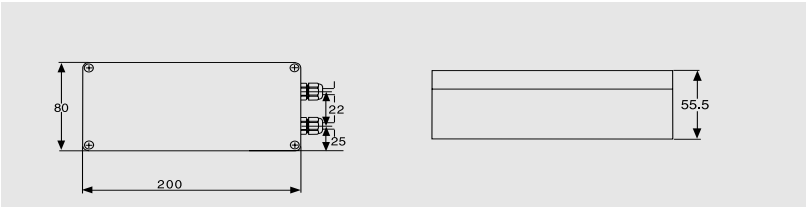
II. Flange connection

(1) Cut the pipe apart to provide the space for mounting the meter

(2) Weld a flange onto each end of the pipe.



Overall dimensions of GSM



Mounting method

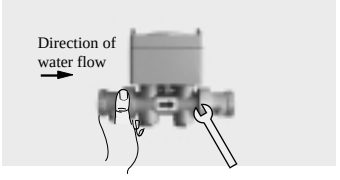
I. Thread connection

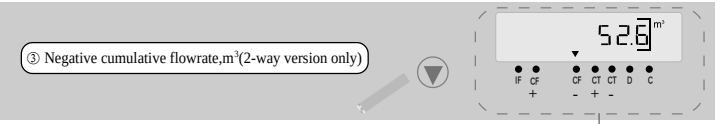
Method 1Without the use of connecting elements

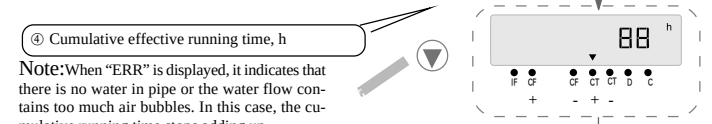
(1) Cut apart the water supply pipe at the mounting point to provide the space for accommodating the meter.

(2) Align the meter concentrically with the pipe. Connect the pipe union with the meter's thread joint and then tighten them with a spanner.

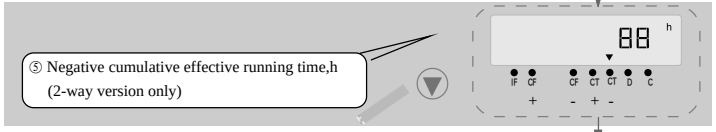
Caution: (1) The connection should be tightly sealed for avoiding water leakage.
(2) The arrow ⟶ on the meter should point to the same direction as that of the water flow.

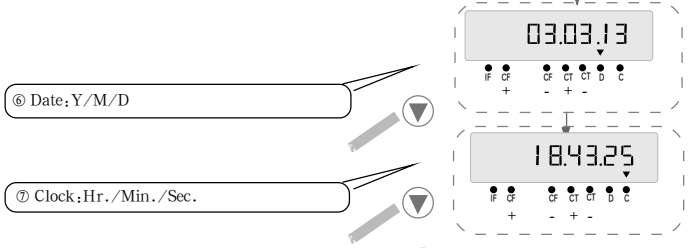






Note:When "ERR" is displayed, it indicates that there is no water in pipe or the water flow contains too much air bubbles. In this case, the cumulative running time stops adding up.





II Setting of Parameters

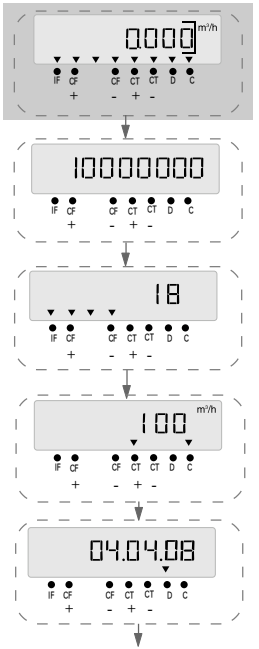
① Keep ▲ key depressed for 3−9 seconds,the meter will enter the effective operation mode after the 8“ ▼ ”symbols appear. For setting each parameter,the abovementioned procedure should be repeated to show this display.For the setting of each the following parameters,the display of the 8 “▲”symbols is omitted.

Note:1.“ ▼ ” indicates the item on display
2.“▼” is a key for setting of parameters
3.“▲” Pressing this key to enter the next screen display.

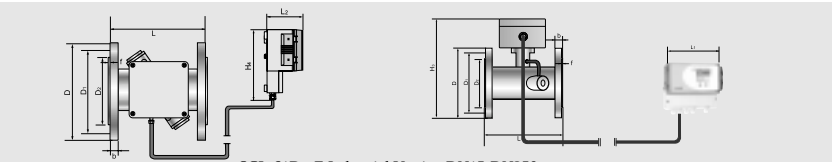
② Damping coefficient,range 1～20

③Set the 4～20mA maximum output value 10～1100(m^3/h)
Note:This setting shoudl be made based on the actual measuring range of the meter used.

④ Date:Y/M/D



Non-integral version



SCL-61Dx-E Industrial Version DN15-DN250

Mounting Dimensions of Flange-Connected Integral & Non-Integral Versions
(Including multi-channel, without mating flange)

Overall Dimensions, mm													Wt.	Pressure	Remarks
DN		D	D1	D2	f	b	d × n	L	L1	H1	H2	H3	H4	(kg)	(MPa)	
50		165	125	99	3	20	19 × 4	200		304	244	238		7.4		d— Diameter of flange connection bore. n— Number of flange connection bores. D1— Center diameter of flange connection bore
65		185	145	118	3	20	19 × 4	200		321	261	255		8.9		
80	S-C*	200	160	132	3	22	19 × 8	200/225		337	277	271		10.5/10.7	1.6	
	D-C*	200	160	132	3	22	19 × 8	250		337	277	271		10.5/10.7		
100		220	180	156	3	24	19 × 8	250	213	356	296	290	185	13.2		
125		250	210	184	3	22	19 × 8	250		384	324	318		16.8	1.0	
150		285	240	211	3	26	23 × 8	300		414	354	348		21.9	1.6	
200		340	295	266	3	26	23 × 8	350		472	412	406		37.3	1.0	
200		340	295	266	3	30	23 × 12	350		472	412	406		38.1	1.6	
250		405	355	319	3	32	28 × 12	400		531	471	465		63		

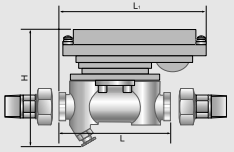
Notes: * S-C - Single-channel version
D-C - Double-channel version

1. The flange size conforms to the standard GB/T 17241.6-1998.
2. The L figures in the Table conform to the specifications as specified in the national standards on all cold water meters excepting the volumetric type single- and multi-bundle flow water meters. For other L values to suit your specific needs, please specify on ordering.

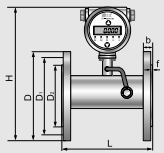
5. Overall Dimensions and Mounting Method

Overall dimensions (mm)

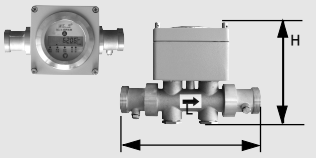
Integral Version



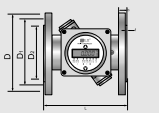
FLOW-SH Household-Use Version
DN15～DN25



DN50～DN250



FLOW-SSCL—61D1—D Industrial Version (Top View)
DN15～DN40



DN50～DN250

Overall Dimensions (mm) of the SCL-61H and FLOW-SD1-D Versions (DN15-DN40mm)

DN	L	L1	H	Connecting Thread	
				W/Connecting Fittings	W/O Connecting Fittings
15	110	146	125	G1／2″	G3／4″
20	130	155	125	G3／4″	G1″
25	130	155	125	G3／4″	G1″
32	230	—	160	G1 1／2″	
40	245	—	210	G2″	

⑤ Clock:hr./min./sec.

Note:For the setting of the following parameters,the entry of a secret code is required.

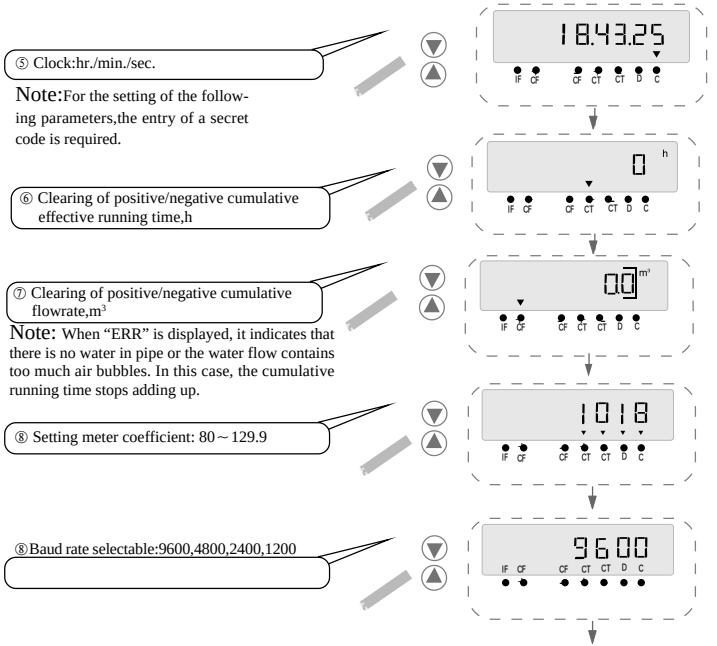
⑥ Clearing of positive/negative cumulative effective running time,h

⑦ Clearing of positive/negative cumulative flowrate,m^3

Note: When “ERR” is displayed, it indicates that there is no water in pipe or the water flow contains too much air bubbles. In this case, the cumulative running time stops adding up.

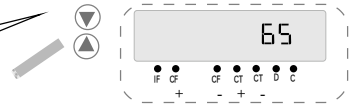
⑧ Setting meter coefficient: 80～129.9

⑧Baud rate selectable:9600,4800,2400,1200



⑨ Setting the meter's account number: 65～165

The setting is completed, and the screen returns to cumulative flowrate display.



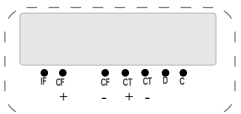
Non-integral version (Operated with manual key)

I. For the display, refer to the corresponding display items as described in the previous section for the integral version.

II. Setting of parameters

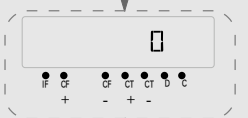
For the setting procedures, the steps (1) ~ (8) are the same as those in the case when an integral meter version is used.

⑨ Zero-point setting



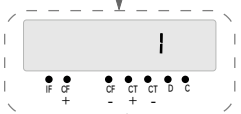
The setting can be made by selecting one of the following different modes (0,1,2,3).

Minimal flowrate value cut-off enabled

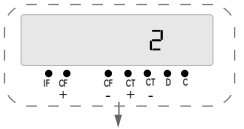


Note:This function is used to cut off the flow velocity values in a range of 0.002 m/s-0.005 m/s

Minimal flowrate value cut-off disabled



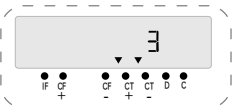
Store and clear the zero-point flowrate valie



Note:1. If at the time when the "▼" key is kept depressed with the magnetic rod, the numbers of "2" ~ "8" are repeatedly displayed in cycles, accompanied at the same time by a display of 7 "2"s at the right side. It indicates a communication failure (failure of setting of parameters).

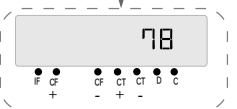
2. If the abovementioned cyclic display procedure is interrupted and a certain display maintains on the screen for a period of over 60 minutes, the screen will automatically go back to display of cumulative flowrate.

⑬Clear the stored zero-point flowrate value



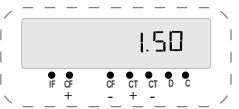
⑭Setting of meter's account number:65～165

The setting is completed, and the screen returns to cumulative flowrate display.



Indication of signal intensity

If the ▲ key is kept depressed for over 10 seconds, there will be an indication of the signal intensity (0.00-1.50).The highest intensity is 1.50.At an intensity of <0.15, "Err" will be displayed,and the meter stops working.



Clicking the ▲ key to return to the screen of cumulative flowrate display.

Note:If within 3 minutes, no further key pushing is made, the screen will automatically go back to display of cumulative flowrate.